



**ANNOUNCING....**

**Contemporary Topics  
in  
Computer Science**



**a series of lectures  
followed by discussions**

**presented in Headquarters**

COMPUTERS -- BUT WERE AFRAID TO ASK

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DATE: September 12, 1972

TIME: 9:00 - 4:00

LOCATION: Headquarters Auditorium

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THE COURSE: Will create an understanding of computer systems. It will suggest how computers may be used to help you and your organization. It will help you to understand those funny words that computer experts use. Finally, it will help you to understand what a computer expert will need to know so that he can help you.

INTENDED FOR: Anyone who wants to understand computers and how they may be helped by computer systems.

NOT INTENDED FOR: Computer Experts.

THE INSTRUCTOR: JOSEPH E. HERMON is currently responsible for the development, design, and coordination of CDC sales training programs and the design and creation of executive presentations. His experience spans 20 years of marketing and marketing support activities in the computer industry. He has assisted in the design and implementation of computing systems for the distribution, manufacturing, automotive, chemical and transportation industries. His applications experience ranges from gathering information using a touch-tone telephone for payroll calculations to Automobile Engineering and Design using large video displays.

In our continuing effort to afford Agency personnel quality programs of education encompassing a broad spectrum of academic interest, the Office of Computer Services is sponsoring a program of 11 three-hour seminars which are directed to those subject areas of greatest interest to the greatest number of our people. Seminar subjects range from "What You Always Wanted to Know About Computers -- But Were Afraid to Ask" to "Queuing Techniques", thus offering courses of interest to people with no computer orientation as well as the most experienced mathematical systems analyst.

The seminars are described in this brochure in the following format: Title, Description, Intended For, Instructor and Course Outline. A brief resume of each instructor is provided and you will note that each is an experienced, recognized authority in his particular field.

For additional information, call X7331.

COURSE OUTLINE

I. WHY COMPUTERS?

A History of Computers

II. WHAT IS A COMPUTER?

The component parts of a computer system and how they work together.

III. WHAT IS SOFTWARE?

The methods of telling a computer what you want it to do.

IV. WHAT IS IT THAT COMPUTERS CAN DO? CANNOT DO? WHY?

Examples of how computers are being used today and will be used in the future.

V. HOW DO I PUT IT TO WORK FOR ME?

Planning, implementing and maintaining a computer application.

THE FOURTH GENERATION

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DATE: September 19, 1972

TIME: 0900

LOCATION: Headquarters Auditorium

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THE COURSE: Will define the 4th generation. The functional characteristics of a 4th Generation System (i.e., the soft machine, microprogramming, parallelism amongst small independent resources) will be described, as well as equipment selection and operation.

INTENDED FOR: Anyone interested in the next generation of computers.

THE INSTRUCTOR: LEONARD A. KREUTER is the Senior Partner of L. Kreuter Associates. From 1965 to 1967, he was employed by the Burroughs Corporation in the position of Product Manager for Burroughs large-scale computing equipment. From December 1967 to June 1968 he was one of the four product planning managers for the Burroughs Corporation. In June 1968, Mr. Kreuter became Chief Operating Officer of E.L.I. Computer Time-Sharing, Inc. In April 1970, Mr. Kreuter founded L. Kreuter Associates, a consulting firm directing its main thrust in the area of remote computation. He received a B.A. from City College of New York and a M.B.A. from Rutgers University.

- I. FUNCTIONAL CHARACTERISTICS OF THE 4TH GENERATION
  - A. Definition
  - B. Independence of Systems Resources carried to the Nth degree
  - C. Major Resource Allocation
  - D. Parallel Units
  - E. The "Soft" Machine
  - F. Microprogramming
  - G. ROM(Read Only Memory)
- II. MANAGING THE 4TH GENERATION SYSTEM
  - A. Resource Utilization Measurement
  - B. Configuration Alteration
  - C. Reconstituting the Soft System
  - D. Equipment Selection
  - E. Scientific Management

MINI-COMPUTERS  
and  
CALCULATORS

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DATE: September 27, 1972

TIME: 9 a.m. - 2 p.m.

LOCATION: Headquarters Auditorium

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THE COURSE: Is an orientation on the "State-of-the Art" and applications of mini-computers and calculators. The emphasis will be on the available equipment, the economics of these new devices and typical areas of application.

INTENDED FOR: Anyone interested in learning about mini-computers and calculators and their applications.

THE INSTRUCTOR: ROBERT A. WEBER, who is President of Ultimacc Systems, Inc., holds the AB Math, BSSE and MSEE from Columbia University. He was Director, Information Systems at Computer Sciences Corporation where he specialized in the simulation of communication systems in computer - communications interface and switching, and studies of management and control of the Defense Communications System. He had conducted a wide range of studies including a highway telecommunications requirements, a total information system study for a major bank, and a corporate information flow system for a large national corporation. He is a member of ORSA, ACM, IEEE.

- I. CAPABILITY AND PERFORMANCE  
COMPARISON OF MINI-COMPUTERS,  
MICRO COMPUTERS CALCULATORS AND  
LARGE-SCALE COMPUTERS
  - A. Hardware Differences
  - B. Software Differences
  - C. Environmental Requirements
  - D. Implementation Differeces
- II. SCOPE OF APPLICATIONS FOR  
MINI-COMPUTERS AND CALCULATORS
  - A. Degree of Processing Intelligence
  - B. Scientific Applications
  - C. Individual Applications
  - D. Business Applications
- III. ECONOMIC TRADE-OFFS
- IV. CHECK LIST FOR PROCURING AND  
INSTALLING THE SYSTEM

SIMULATION  
and  
MODELING

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DATE: October 3, 1972  
TIME: 9:00 a.m. to 2:00 p.m.  
LOCATION: Headquarters Auditorium

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THE COURSE: Modeling is rapidly becoming an effective planning tool in government and industry. The purpose of this course is to review the latest developments in modeling theory and practice, and to present information on successful modeling applications. A variety of models ranging from qualitative "scenarios" to mathematical simulations will be presented with appropriate discussion of characteristics, applications and potential pitfalls.

INTENDED FOR: Anyone interested in learning about the latest developments in modeling and how they are being applied. The course assumes no knowledge of the subject on the part of the attendee.

THE INSTRUCTOR: GERALD L. BARKDOLL is the Deputy Assistant Commissioner for Planning and Evaluation of the Food and Drug Administration. He was formerly Controller of the Englander Company and held positions of Manager of Business Planning and Senior Economic Analyst. He has published, lectured and consulted on the theory and implementation of planning systems. Mr. Barkdoll received a B.S. in Engineering and a M.B.A. from Drexel University. He is a member of the Planning Executives Institute and the American Institute of Industrial Engineers.

COURSE OUTLINE

- I. MODEL TYPES AND ATTRIBUTES
- II. MODELS IN PLANNING AND DECISION  
MAKING
- III. IMPLEMENTATING A MODEL
- IV. REVIEW OF SUCCESSFUL MODEL  
APPLICATIONS
- V. STATE OF THE ART AND EXPECTED  
FUTURE OF MODELING

VIRTUAL MEMORY  
and  
VIRTUAL MACHINES

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DATE: October 11, 1972

TIME: 9 a.m. - 2 p.m.

LOCATION: Headquarters Auditorium

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THE COURSE: Will acquaint the participant with the concepts of virtual memory and virtual machine computing systems. The historical development, defining why the concepts were developed and by whom, is followed by a technical discussion of what these concepts imply. The areas of applicability and associated costs and benefits are discussed.

INTENDED FOR: Anyone with an interest in computer technology, particularly the evolution from theory to practical application.

THE INSTRUCTOR: SAUL STIMLER draws upon more than 25 years of widely diversified technical, management and business experience. For two years, Mr. Stimler was manager of RCA's time sharing project in which a virtual memory system was developed. Mr. Stimler contributed to the design of the architecture, the cost/ performance analysis, and performance measurement of the system. Since forming Stimler Assocs. in 1970, he has provided consulting services and tailored training courses for several Fortune 500 companies in the U.S. and Canada. Mr. Stimler is author of Real-Time Data Processing Systems published by McGraw-Hill.

Approved For Release 2000/08/28 : CIA-RDP78-03090A000500020008-6  
COURSE OUTLINE

I. HISTORICAL DEVELOPMENT

A. Multi-Programming

1. Concept
2. Limitations

B. Multi-Processing

1. Complexity and Cost

C. Software Problems

1. Overlays and Storage Management

II. RESOURCE ALLOCATION

A. Virtual Memory

1. Hardware Required
2. Segmentation
3. Paging
4. Demand Paging

B. Implications for Systems Software

1. Operating Systems
2. Compilers and Loaders
3. Software Programming Practice

C. Virtual Machines

1. Hardware-Software Interaction
2. The Programmer's View

III. CONCLUSIONS

A. Application Areas

B. Costs

QUEUING

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DATE: October 17, 1972  
TIME: 9 a.m. - 2 p.m.  
LOCATION: Headquarters, Room GA 13

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THE COURSE: Will emphasize the relevant application of waiting-line models with only secondary consideration to the development of theoretical relationships for specific cases. Simple analytical models will be exploited for the results they furnish in special cases; computer-simulation techniques will be employed to resolve general and typically, real-life queuing situations.

INTENDED FOR: Mathematical Programmers, Mathematicians and Systems Analysts.

THE INSTRUCTOR: DR. THEODORE J. WANG is Director of the Institute for Creative Studies at the Catholic University of America, Professor of Operations Research at Federal City College, Washington, D.C., and a member of the Education Committee of the Operations Research Society of America. He is a member of the Scientific Advisory Group, U.S. Army Mobility Equipment Research and Development Command. Dr. Wang holds a BS in Engineering Physics, and a Ph.D. in Physics from the University of Illinois.

COURSE OUTLINE

I. BASIC CONSIDERATIONS

- A. Terminology
- B. Queue Systems
- C. Queue Discipline

II. IDEAL CASE

- A. Poisson arrivals and exponential service times

- 1. Single Server

- a. Theory
    - b. Applications

- 2. Multiple Server

- a. Theory
    - b. Applications

- B. Poisson arrivals and Erlang service times (single server)

- 1. Theory
  - 2. Applications

III. GENERAL CASE (Monte Carlo Solution)

- A. Methodology
- B. Applications

THE INDEXING FACILITY

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DATE: October 31, 1972  
TIME: 9 a.m. - 2 p.m.  
LOCATION: Headquarters, Room GA 13

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THE COURSE: A discussion of Indexing that defines the concepts and various techniques which might be employed in creating an effective information system or on-line real time operating environment.

INTENDED FOR: Applications and Systems Programmers who are interested in a general overview of the basic techniques in Indexing Schemes.

THE INSTRUCTOR: HAROLD UHRBACH is a founder and Principal of DBD Systems. He is former Director of Professional Services for Auerbach Associates, Inc. He has devoted twenty years to the related fields of systems analysis and design. Formerly, he was an advanced techniques specialist in data base structures and management, and is currently pursuing this area of interest. He was also Manager of Applications for CDC and Manager of Computer Applications for the Bendix Corporation. Mr. Uhrbach lectures at the New York University Management Institute where he created and now teaches data management techniques.

COURSE OUTLINE

I. CONCEPT OF INDEXING

- A. Directed Retrieval
- B. Indexed vs. Sequential Operation

II. METHODS OF INDEXING

- A. Indexed Sequential
- B. Inverted Indexing
- C. Bit Indexing
- D. Indexed Random

III. INDEXING CONSIDERATIONS

- A. Dual Access Requirements
- B. Secondary Retrieval
- C. Conditional Search
- D. Indexing vs. Randomizing

IV. FUNCTIONAL ENVIRONMENT

- A. On-Line/Real Time
- B. Information Systems
- C. Information Storage and Retrieval

INTERPRETATION

vs.

COMPILATION

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DATE: November 8, 1972

TIME: 9 a.m. - 2 p.m.

LOCATION: Headquarters, GA 13

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THE COURSE: Resolves the long-term interpret-compile controversy. Interpreters and compilers are essentially identical but with differing economic advantages. The distinct advantages of each are discussed, and then a practical alternative is described.

INTENDED FOR: Anyone interested in the relationship of complex software in computers. No knowledge of the subject is assumed, however, some knowledge of computer software is necessary.

THE INSTRUCTOR: TERRY DOLLHOFF is presently the project Engineer for the CMS-2 compiler system for the U.S. Navy. He has had experience with most of the major computer languages, and has written several compilers. Mr. Dollhoff's theoretical background includes research in precedence, operator precedence and LF(k) grammars, and is currently developing extended precedence techniques of compiler writing. Mr. Dollhoff is a member of Tau Beta Pi, Phi Kappa Phi, and the Association for Computing Machinery. He received a B.S. degree in Computer Science from Michigan State University.

I. HISTORICAL DEVELOPMENT

- A. Early Interpreters
- B. Interpretive-Only Languages
- C. The Interpretation-Compilation Equivalence

II. INTERPRETATION

- A. The Hypothetical Machine Concept
- B. Some Intermediate Languages

III. COMPILATION

- A. The Speed Advantage
- B. The Conveniences Lost

IV. THE IDEAL PROGRAMMING ENVIRONMENT

- A. Interpretation's Advantages
- B. Compilation's Advantages
- C. Getting all the Advantages at once

COMPILER - COMPILERS  
and  
TRANSLATORS

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DATE: November 15, 1972

TIME: 9 a.m. - 2 p.m.

LOCATION: Headquarters, GA 13

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THE COURSE: Will investigate the internal workings of compiler-compilers and other compiler-writing systems. The original steps that led to the implementation of early examples are mentioned to form a basis for justification. The internal operation of simple compiler-compilers is disclosed, and some practical uses are shown. Why a compiler-compiler should or should not be used is discussed in conclusion.

INTENDED FOR: Anyone interested in the relationship of complex software in computers. No knowledge of the subject is assumed, however, some knowledge of computer software is necessary.

THE INSTRUCTOR: TERRY DOLLHOFF is presently the Project Engineer for the CMS-2 compiler system for the U.S. Navy. He has had experience with most of the major computer languages, and has written several compilers. Mr. Dollhoff's theoretical background includes research in precedence, operator precedence and LF(k) grammars, and is currently developing extended precedence techniques of compiler writing. Mr. Dollhoff is a member of Tau Beta Pi, Phi Kappa Phi, and the Association for Computing Machinery. He received a B.S. degree in Computer Science from Michigan State University.

COURSE OUTLINE

- I. HISTORICAL DEVELOPMENT
  - A. Automatic Programming Efforts
  - B. Early Language Processor Concepts
  - C. Evolution of Meta-Languages
- II. SYNTAX AND RECOGNITION
  - A. Top-down and Bottom-up Methods
  - B. Simple Recognition Processes
- III. SEMANTICS AND TRANSLATION
  - A. Difficulties in Descriptions
  - B. Some Practical Examples
- IV. CONCLUSIONS
  - A. Some Other Uses
  - B. Why the Unpopularity?
    - 1. Among Manufacturers
    - 2. Among Users

LINEAR PROGRAMMING

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DATE: December 5, 1972  
TIME: 9 a.m. - 2 p.m.  
LOCATION: Headquarters, Room GA 13

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THE COURSE: Is intended to introduce the participant to linear programming techniques. Since its origins in the post-WWII periods as an operations research technique for USAF planning problems, linear programming has grown into a branch of applied mathematics. It is perhaps the most extensively used methodology of management science. Although generalized into the field of mathematical programming, it remains the workhorse and depends completely on computers for its practical application.

INTENDED FOR: Anyone interested in advanced management science techniques. The course assumes an understanding of mathematical models and computer technology.

THE INSTRUCTOR: WILLIAM ORCHARD-HAYS is an Independent Management Consultant in the areas of design, implementation, installation and servicing of large software systems; data management theory and practice; algorithm engineering in the field of Mathematical Programming; and organization of EDP procedures and computational methods. From 1969 to 1971 Mr. Orchard-Hays was chief architect and managing head of software

development in mathematical programming with Management Science Systems, Inc. Prior to 1969, he directed design, implementation and documentation of the OPTIMA System for Control Data Corporation's 6000 series of Computers and LP/600 for General Electric's 600 line. He has consulted to IBM as the Chief Designer of MPS/360 as well as Honeywell and RCA on advanced optimization techniques.

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COURSE OUTLINE

- I. BACKGROUND AND RANGE OF LINEAR PROGRAMMING TECHNOLOGY
- II. THE SIMPLES LINEAR PROGRAMMING MODEL  
THE ASSIGNMENT PROBLEM
- III. GENERAL LINEAR PROGRAMMING MODELS
- IV. THE FUNDAMENTAL DUALITY THEOREM
- V. MATHEMATICAL PROGRAMMING SYSTEMS
- VI. THE LINEAR PROGRAMMING AND MATH PROGRAMMING COMMUNITY

PARALLEL PROCESSING MACHINES

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DATE: December 14, 1972  
TIME: 9 a.m. - 2 p.m.  
LOCATION: Headquarters, Room GA 13

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THE COURSE: Discusses the varying ways in which parallel processing is accomplished (i.e., like processors, unlike parallel processors, duplexed systems, etc.), the objective of each as well as the degree of effectiveness and difficulties.

INTENDED FOR: Anyone interested in learning about one of the newest developments in computer hardware and software.

THE INSTRUCTOR: LEONARD A. KREUTER is the Senior Partner of L. Kreuter Associates. From 1965 to 1967 he was employed by the Burroughs Corporation in the position of Product Manager for Burroughs large-scale computing equipment. From December 1967 to June 1968, he was one of the four product planning managers for the Burroughs Corporation. In June 1968, Mr. Kreuter became Chief Operating Officer of E.L.I. Computer Time-Sharing, Inc. In April 1970, Mr. Kreuter founded L. Kreuter Associates, a consulting firm directing its main thrust in the area of remote computation. He received a B.A. from City College of New York and a M.B.A. from Rutgers University.

COURSE OUTLINE

- I. OBJECTIVE OF PARALLEL PROCESSOR
  - A. Incremental Processing Power
    - Multiple like processors
    - Multiple unlike processors
    - Special purpose processors
  - B. Reliability and Back-up
    - Fail Soft/Graceful Degradation
    - Duplex Systems
    - MTBF/MTTR
- II. FUNCTIONAL CHARACTERISTICS OF A PARALLEL PROCESSING SYSTEM
  - A. The Independent Processor Resource
  - B. Operating System Interface
  - C. Job Interface
  - D. Priorities for Processor Assignment
  - E. Degrees of Efficiency

SCHEDULE

What you always wanted to know about computers - but were afraid to ask	12 Sep. 1972
The Fourth Generation	19 Sep. 1972
Mini-Computers and Calculators	27 Sep. 1972
Simulation and Modeling	3 Oct. 1972
Virtual Memory and Virtual Machines	11 Oct. 1972
Queuing	17 Oct. 1972
The Indexing Facility	31 Oct. 1972
Interpretation vs. Compilation	8 Nov. 1972
Compiler - Compilers and Translators	15 Nov. 1972
Linear Programming	5 Dec. 1972
Parallel Processing Machines	14 Dec. 1972